

## THE DIPLOPOD FAMILY STRIARIIDÆ.

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*Custodian of Myriapoda.*

The following descriptions and figures were prepared several years ago, before the publication of the posthumous papers of the late Mr. Bollman. Since that time *Striaria* has been recognized as the type not only of a family but of a distinct suborder. The structural similarities of *Lysiopetalum*, *Chordeuma*, and *Striaria* are so great that the inference of affinity is unavoidable; but it is equally plain that the genera mentioned represent diverging lines, and no forms are yet known which can be looked upon as connecting the three groups. Accordingly, the suborders Lysiopetaloidea, Chordeumatoidea, and Striarioidea have been arranged under the ordinal name Colocheta, but as no formal characterization nor synopsis including this order has been published these deficiencies are supplied below.

### ANALYTICAL KEY TO THE ORDERS OF CHILOGNATHA KNOWN FROM THE UNITED STATES.

Body composed of not more than 13 distinct segments; males have legs at the posterior end of the body modified to assist in copulation: Order ONISCOMORPHA.

Body composed of at least 19 segments; males have one or both pairs of legs of the seventh segment modified to assist in copulation, the posterior legs being normal .....

Body composed of 20 (rarely 19) segments, which are complete chitinous rings, all the primitive sclerites being completely fused, even the sutures being obliterated: Order MEROCHETA.

Body composed of 30 (rarely 26 or 28) segments and above; fusion of primitive sclerites less complete, at least the pedigerous laminae separated by distinct sutures .....

Males with eight pairs of normal legs in front of the 4-5-jointed copulatory legs, which are the posterior pair of the seventh segment and the anterior pair of the eighth; head and mouth-parts greatly reduced, the latter suctorial rather than manducatory: Order COLOBOGNATHA.

Males with seven more or less normal legs in front of the seventh segment, of which the anterior pair, and usually both pairs, are transformed into simple or 2-jointed copulatory organs; head large, the mouth-parts well developed and distinctly manducatory .....

Segments 1-5 with a single pair of legs each; plura indicated by a longitudinal suture, which is met above by two transverse sutures crossing the dorsal part of the segment; labrum with a median sinus: Order ANOCHETA.

Segments 3 or 4 footless, segment 5 with two pairs of legs; plura entirely obliterated; transverse suture single or wanting; labrum with a median tooth .....

Gnathochilarium with stipes broad at base, in contact in the median line between the mentum and promentum; external seminal ducts adnate: Order ZYGOCHETA.

Gnathochilarium with stipes narrower at base, widely separated by the mentum and promentum, which are in contact; external seminal ducts distinct or wanting.....

Pedigerous laminae free throughout; external seminal ducts wanting, the apertures being located in the coxae of the second pair of legs: Order CÆLOCHETA.

Pedigerous laminae adnate (except the first two); external ducts distinct: Order DIPLOCHETA.

### Order CÆLOCHETA Cook.

*Cælocheta* Cook, American Naturalist, December, 1895, p. 1115; Brandtia, 1896, p. 8.

Labrum tridentate, with a median tooth.

Mandibular stipe with a distinct cardo, not areate.

Gnathochilarium with stipes proximally separated by the mentum; cardo small.

Mentum large, entire, trapezoidal or semielliptic.

Promentum small, triangular, included between the bases of the lingual laminae (obsolete in some Chordeumatoidea).

Lingual laminae distinct; lingual lobes provided with sense cones.

Median lobe well developed, with a styliform or tridentate chitinous process on each side.

Last segment at apex with a pair of articulated setiferous papillae known in some cases to function as spinning-organs.

Pedigerous laminae all free; pleurae completely coalesced with scuta.

Legs seven-jointed (except the first two pairs, which are six-jointed), second joint very short.

Genital openings of males in the posterior face of the coxae of the second pair of legs.

Legs of the seventh segment, and usually some others, modified for copulatory purposes.

The members of this order are distributed throughout the north temperate zone, with outliers known from the mountains of the Malay region and from New Zealand.

The affinities of this order are probably with the Merocheta, but it must be admitted that the characters on which this inference is based are mostly primitive rather than derivative, and are shared also by the Monocheta. The great external similarity of the orders of the Chilographa is explainable by the fact that they have not differentiated in response to habits changed by entering different fields in the economy of nature. Their wonderfully fixed structural differences can not on this

account be overlooked in taxonomy and classification, but should be ascribed to isolation since remote periods, as the geologic remains testify.

ANALYTICAL KEY TO THE SUBORDERS OF CELOCHÆTA.

Body composed of over 40 segments; repugnatorial pores present: Suborder LYSIOPETALOIDEA.

Body composed of 30 segments (rarely 26, 28, or 32); repugnatorial pores wanting.....

First segment subreniform, narrower and smaller than the large, exposed head; last segment entire at apex: Suborder CHORDEUMATOIDEA.

First segment broadly expanded in front and below, hoodlike, including and concealing the much smaller head; last segment three-lobed at apex: Suborder STRIARIOIDEA.

Suborder LYSIOPETALOIDEA Cook.

*Callipodoidea* POCOCK, Journ. Linn. Soc. London, 1894, XXIV, p. 477.

*Lysiopetaloida* COOK, Ann. N. Y. Acad. Sci., 1895, IX, p. 3.

Body subcylindric, composed of more than 40 segments in the adult, capable of being coiled in a close spiral; exoskeleton moderately thick and firm.

Head large, exposed; antennæ remote; labrum not produced.

First segment small, narrower than the head.

Segments with very numerous longitudinal grooves whose prominent edges are called carinæ; setiferous tubercles wanting; repugnatorial pores present.

Anal segment entire; movements agile.

The name to be used for this suborder depends upon the distinctness of the genera *Callipus* Risso, and *Lysiopetalum* Brandt. If held as synonymous, the former name is older and family and subordinal designations must be founded upon it, but until this identity is more clearly proven the priority of the family name Lysiopetalidæ requires its use, with which the suborder should be made consistent.

Suborder CHORDEUMATOIDEA Cook and Collins.

*Chordeumatoidea* COOK and COLLINS, with POCOCK, Max Weber's Reise, 1894, p. 341.

*Craspedosomatoidea* COOK, Ann. N. Y. Acad. Sci., 1895, IX, p. 3.

Body subsylindric or depressed, subfusiform, composed in the adult of 30 segments (rarely 26, 28, or 32); capable of being coiled into a rather open spiral; exoskeleton thin and fragile.

Head large, exposed; antennæ remote; labrum not produced.

First segment large, narrower than the head, and articulated in a broad emargination of its occiput.

Segments usually smooth, rarely somewhat roughened, but in all such cases with the dorsum flattened and the sides produced into lateral carinæ after the manner of the Polydesmidæ; setiferous tubercles present, six on each segment; repugnatorial pores wanting.

Last segment entire; movements agile.

This suborder may retain its earlier name if the Chordeumatidæ and Craspedosomatidæ are recognized as distinct families; otherwise the second name must be used, as that is the older for the family and the subordinal designation must be kept uniform with it.

Suborder STRIARIOIDEA Cook.

*Striarioidea* COOK, *Brandtia*, 1896, p. 8.

Body subcylindric, composed of 30 segments in the adult; capable of being coiled in a very close spiral: exoskeleton comparatively thick and firm.

Head small, included and concealed by the expanded first segment.

Antennæ inserted near together, below the middle of the head.

Labrum of male produced laterally into a large curved spine.

First segment very large, hood-like, concealing the head.

Segments with numerous abrupt and prominent carinæ; setiferous tubercles wanting; repugnatorial pores wanting.

Last segment trilobed.

Movements very slow.

Family STRIARIIDÆ (Bollman).

*Striariina* BOLLMAN, *Bull. U. S. Nat. Mus.*, 1893, No. 46, p. 158.

*Striariidæ* COOK, *Ann. N. Y. Acad. Sci.*, 1895, IX, p. 4.

Body subcylindric, capable of being coiled into a very close spiral.

Head small, mostly covered by the first segment; the face on each side broadly and deeply depressed.

Labrum in males produced at each end into a long decurved stylus.

Eyes poorly developed, of few ocelli, remote from the antennæ.

Antennæ inserted near together, below the middle of the head.

Mandibles with 10 pectinate lamellæ, a dentate lamella, a molar tooth, and a large masticatory plate; cardo very large; exposed surface of stipes small (compared with other families), nearly flat, not areate.

Mentum semielliptic.

Median lobe with a styliform process on each side.

First segment much larger than the others, expanded and produced anteriorly, hood-like, concealing the head.

Segments dorsally multicarinate longitudinally, and rough tuberculate; below unicarinate. Carinæ of equal size, the lateral carinæ not larger than the others. Median furrow present, including a fine ridge; setigerous tubercles wanting.

Supplementary margin regularly pectinate.

Pedigerous laminae anteriorly prominent.

First, second, fourth, and antepenultimate segments each with one pair of legs, the third and last two footless; the last two complete rings; whole number of legs 50.

Anal segment without carinæ, broadly trilobed. Under the apex with two papillæ.

Third pair of legs of males with the coxæ produced medianly into long, flask-like processes whose apices are accommodated by an excavation in the posterior face of the coxæ and second joint of the second pair of legs.

In males both pairs of legs of the eighth segment are modified into a complex copulatory apparatus, partially concealed and normally not projecting below the sides of the body.

Number of segments of adult, 30; younger stages unknown.

*Distribution.*—Temperate North America.

#### Genus STRIARIA Bollman.

*Striaria* BOLLMAN, ANN. N. Y. Acad. Sci., 1888, IV, p. 108.

Body small, about nine times as long as broad, cylindrical subfusiform, narrowed posteriorly and behind the first segment. Head somewhat narrowed at the antennæ.

Vertex granular roughened, with evident longitudinal and transverse sulci.

Labrum in males produced at each end into a long decurved spine.

Eyes poorly developed, of few ocelli (5 to 9) differing in size and without regular arrangement.

Antennæ geniculate, of moderate length, joint longest, the others in order of length.

Mandibles with 10 pectinate lamellæ.

Cardo of gnathochilarium beset with spines.

Pronotum small, triangular, slightly longer than broad.

First segment more than twice as long as the second, semielliptic, decurved at the sides, hood-like, concealing the head, strongly tuberculate, medianly and posteriorly with 10 longitudinal carinæ; median carinæ short, the others gradually longer; anterior and lateral margins raised.

Subsequent segments with 12 dorsal and lateral and 2 ventral carinæ, the latter separated from the others by a considerable ecarinate space. Surface not occupied by the carinæ rough with coarse, scattered, spinose tubercles.

Supplementary margin regularly pectinate with short, broad teeth.

Last segment projecting beyond the valves, ecarinate, very strongly tuberculate, posteriorly tridentate; the teeth broad and blunt, the incisions narrow, moderately deep; two long-conic, translucent papillæ at the base of the projecting apex.

Anal valves much flattened, strongly tuberculate, with 3 bristles.

Preanal scale semicircular, rough, with 2 bristles.

Pedigerous laminae broadly shield-shaped, inflated in front at apex and strongly tuberculate.

Stigmata large, elliptic, somewhat oblique, distant from the insertion of the legs.

First two pairs of legs small, 6-jointed.

Third pair of legs of males small, the coxæ very large, flask-like, produced ventrad into long processes.

Fourth, fifth, sixth, and seventh pairs of legs of males crassate, gradually larger from the fourth; third joint especially hypertrophied.

Male genitalia double, both laminae divided at apex into complex spinose and laciniate processes.

Ninth pair of legs of male two-jointed, the basal joint small, the apical capitate, shaped somewhat like a shoe.

Tenth legs of males with coxæ perforate.

*Distribution*.—Central Eastern States; also California.

The specimens on which this family is based differ from any known members of the *Chordeumatoidæ* in the small head, poorly developed eyes, the antennæ inserted far from the eyes, low down and near each other, the moderate mandibular stipes, and the large first segment, characters in which they resemble the *Polyzonidæ*. They differ further from the *Chordenmatidæ* in the semicircular mentum, the carinae and rough granules of the segments, the trilobed anal segment, the flat anal valves and the peculiar second and third pairs of feet, all of which characters seem to be more or less unique. The carinae are not similar to those of the *Julidæ* and *Lysiopetalidæ*, being abrupt elevations of the surface, and not the edges of grooves. From the *Julidæ* and *Lysiopetalidæ* they differ in having no repugnatorial pores, and in this character are nearest the *Chordenmatidæ*, with which they also agree in having 30 segments.

#### STRIARIA GRANULOSA Bollman.

(Plate LIII, figs. 1a-1j.)

*Striaria granulosa* BOLLMAN, Ann. N. Y. Acad. Sci., 1888, IV, p. 108; Bull. U. S. Nat. Mus., 1893, No. 46, p. 83.

*Type*.—No. 230, U.S.N.M.

*Locality*.—Beaver Creek, Jefferson County, Tennessee.

Length, 11 mm.; width, 1.2 mm.

Color in alcohol dull brownish, but probably stained from the rubber cork. In life probably much like the next species.

Body cylindrical, wider anteriorly, tapering very slightly caudad, and with twelve large carinae on each segment.

Head with sides flattened above and pubescent with fine, short hairs.

Vertex finely granular, roughened; below the anterior edge of the first segment with a medianly well-pronounced transverse furrow. In front of this the vertex is medianly prominent and laterally plane or depressed. The median sulcus is very shallow posteriorly, becoming gradually deeper and broader, and with a gradually more prominent ridge on each side. The ridges begin about halfway from the first

segment to a line connecting the bases of the antennæ, and diverge to the antennal sockets. The triangular space included is colored dark, with a median, longitudinally oval, light spot and a light spot between the antennæ.

Clypeus subquadrate, moderately convex, hirsute with rather short hairs, roughened medianly with fine, irregular, transverse wrinkles, laterally with very fine granules; lateral edges nearly straight, subparallel; lateral corners and lower median portion depressed and provided with a few hairs.

Eyes located on posterior of vertex, close to the edge of the first segment, of irregular shape, composed of five ocelli of moderate size. They are distant from the antennæ and are not close to the lateral margin of the head.

Antennæ located below the middle of the head and nearer to the median line than to the lateral margin. When the animal is coiled up the antennæ are held with the first three joints perpendicular, the fourth bent outward at a right angle to the third, the fifth is bent downward at a right angle to the fourth, the sixth, seventh, and eighth in a line with the fifth (fig. 1i) olfactory cones with high bases, to which they are articulated; that is, apparently two-jointed.

First segment very large, more than twice as long as the exposed portion of the second segment, very rough with rough granules, and on the posterior part of the dorsal portion with ten longitudinal carinae, well pronounced, but not as large as those of the succeeding segments; median carinae short, the lateral ones extending nearly across the segment; about one fifth of the segment on each side is without carinae. The posterior edge of the segment straight, and both the posterior and anterior lateral corners rounded; anterior portion of segment inflated and expanded so as to cover the head, the anterior lateral corners slightly produced; anterior edge with a raised margin and slightly curved, so that the lateral length is about two-thirds of the dorsal.

Third segment footless, one pair of legs on the fourth segment, with protuberances from the coxæ (fig. 1d). These legs are free; that is, not joined to the body except internally (the projections curve forward), so that this pair of feet could be protruded.

Segments subsequent to the first with a small median carina, and with six others, much larger, on each side, thicker and higher at their posterior ends. Below these the surface of the segment is smooth for a space about equal to three times the distance between two carinae, or very finely roughened, but without the slightest trace of longitudinal carina or striation. Below this is another carina, distant from the ventral edge of the segment by somewhat more than the distance between two dorsal carinae. This carina projects anteriorly from the subsegment, and does not reach its posterior margin. The exposed surface of the anterior subsegments and the posterior region of the posterior are very rough with granules, and one or two more or less

irregular rows of larger, rougher, granules are in the spaces between the dorsal carinae. The whole surface of the segments and carinae is finely granular-roughened, so as not to appear smooth and shining. The dorsal median carina decreases gradually caudad. The carinae are very abrupt elevations, and differ very strikingly from those of *Lysioptalum*, not having the appearance of the edges of grooves as in that genus. The anterior granule between the dorsal carinae is slightly larger than the others, and is tipped with a larger, though small, seta, very small setae being sometimes discernible on other granules. On the first segment and on the posterior segments the granules are larger, very rough and wart-like. On the posterior segments the carinae are closer together and slightly larger.

Penultimate and antepenultimate segments yellow, without the ventral carinae, like the first. Penultimate segment footless.

Last segment anteriorly somewhat constricted, very rough and granular, posteriorly broadly and bluntly, though deeply, tridentate; on the sides moderately sinuate, with no trace of carinae.

Anal valves very flat, slightly convex in the middle, very rough with granules.

Preanal scale semicircular, convex, very rough, with two long hairs.

#### STRIARIA COLUMBIANA, new species.

(Plates LIII, fig. 3a; LIV, figs. 1a-1m.)

*Type* No. 775, U.S.N.M.

*Locality*.—Washington, D. C.

Length, 10 mm.; width, 1 mm.

Differs notably from the preceding in the much smaller carinae, the more shallow incisions of the terminal segment, the larger processes of the coxae of the third pair of legs, the longer ventral lobe of the fourth segment.

Color horn-brown, dark above, usually lighter between the three lateral carinae, which gives the appearance of a yellow lateral line; below this line darker, then lighter. Ventral parts and three basal joints of legs dirty white, the apical darker. Last three segments yellowish or whitish, abruptly differing from the others; sometimes, however, the last segment is brownish. Antennae usually colored like the legs. A fine pale median line is usually apparent, as well as a light transverse band near the suture between the subsegments. Near the posterior margin of each segment is a finer dark line sinuate at the carinae, and running back upon each, thus giving the appearance of a series of arches.

The second and third of the dorsal carinae, counting from side, are farther apart than the others, while the first and second are nearest together; the first is also more or less curved. Between each pair of carinae, that is, in every second space, is a small setiferous tubercle



perhaps representing those of the Chordeumatoidea; this is opposite the anterior ends of the carinæ.

Preanal scale very broadly rounded or subtruncate.

The setiferous papillæ (spinning organs) of the last segment have their bases much longer and more slender than in the Craspedosomatidæ.

This species is not uncommon in dry woods in the District of Columbia. It seems most abundant in the woods near the Catholic University, to the south of the Soldiers' Home grounds. The creatures frequent small hollows filled with decaying leaves in rather open dry woods consisting mostly of oak. Other myriapods were scarce, and the *Striaria* outnumbered all other species combined. It has been collected also in the Zoological Park and at Glen Sligo.

The distinctness of these animals from the Craspedosomatidæ is very evident in the living condition. The Craspedosomatidæ are the most active and fleet of foot of the Diplopoda, while *Striaria* is as slow as the slowest *Polyzoniium*. When disturbed they at once coil up tightly and remain in that condition several minutes, sometimes for a considerable period, after which they slowly uncoil and as slowly move away. All their movements are sluggish and clumsy, their whole dependence being apparently placed on their strong armor.

STRIARIA CALIFORNICA, new species.

(Plate LIII, fig. 2a.)

*Type*.—No. 776, U.S.N.M.

*Locality*.—California.

Length, 13 mm.; width, 1.4 mm.

Color in alcohol pale horn-brown.

Distinguished from the preceding by the larger size, more cylindrical body, less constricted behind the head, proportionally somewhat smaller dorsal and larger ventral carinæ, fewer and smaller tubercles. First segment proportionally slightly smaller than in *S. granulosa*.

Eyes, seven, of different sizes and without regular arrangement.

Dorsal carinæ æqui-distant; the lateral not differing from the others in this respect.

Anal segment not so rough, dark colored, darker than those immediately preceding it; apical lobes broad, the notches narrow.

Length, 13 mm.; width, 1.4 mm.; habitat, California, probably near Sausalito.

Collected by Major Thomas L. Casey. A single female specimen.

## EXPLANATION OF PLATES.

## PLATE LIII.

*Striaria granulosa*, male.

- Fig. 1a. Gnathochilarium.  
 1b. First pair of legs.  
 1c. Second pair of legs.  
 1d. Third pair of legs.  
 1e. One side of the ventral part of segment 4.  
 1f, 1g. Views of apical portion of copulatory legs.  
 1h. Last segment, from above.  
 1i. Head and first three segments, from below.  
 1j. Same, from the side.

*Striaria californica*.

- 2a. Last segment, from above.

*Striaria columbiana*.

- 3a. Last segment, from above.

## PLATE LIV.

*Striaria columbiana*—continued.

- Fig. 1a. Labrum of male.  
 1b. Median part of same, more highly magnified to show the arrangement of the setiferous punctations.  
 1c. Mandible.  
 1d. Last joint of same.  
 1e. Last two joints of antenna.  
 1f. Segments 3 to 7, ventral view, showing legs, peüigerous laminae, and spiracles.  
 1g. Third pair of legs of male.  
 1h, 1i. Different aspects of the apical portion of the copulatory legs.  
 1j. Ninth pair of legs of male, the second pair of the seventh segment.  
 1k. Copulatory legs, anterior face.  
 1l. Last eight segments, ventral view.  
 1m. Last six segments, lateral view.